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Spontaneous symmetry breaking and the local freeze-out in Tl2+ -doped KH2AsO4

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Abstract

The slowing down of the local order-parameter fluctuations and the spontaneous dynamic symmetry breaking at a defect site in an order-disorder hydrogen-bonded system describable by an Ising model in a transverse-field Hamiltonian has been evaluated and shown to depend on the range of the forces with which the defect couples to the host lattice. The spontaneous symmetry breaking observed far above Tc in the EPR spectra of defect centers in KH2AsO4-type crystals is shown to be compatible with such a local slowing down and "pseudo-freeze-out" around defects which couple to the surrounding pseudospins via short-range forces which are significantly stronger than the interaction forces in the undisturbed lattice. No such freeze-out occurs for the Tl2+ ions which are coupled to the surrounding pseudospins via long-range forces. © 1982 The American Physical Society.

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